

Human Health Risk Assessment:

Risk, as applicable to environmental pollutants, can be explained as the chance of harmful effects to human health or to ecological systems resulting from exposure to an environmental stressor. Risk assessment is used to characterize the nature and magnitude of this risk to humans (e.g., residents, workers, recreational visitors) and ecological receptors (e.g., birds, fish, wildlife) from chemical contaminants and/or other environmental stressors.

The risk assessment, under VSWMR, is applied at the following junctures:

1. Calculate [Default Alternate Concentration Limits \(ACL\)](#) that get incorporated into the permit as Groundwater Protection Standards (GPS) (9VAC20-81-250.6.b)
2. [Site Specific ACL Proposal](#) (9VAC20-81-250.6.b.(4).b. (i), (ii), and (iii))
3. [Proposed Presumptive Remedy \(PPR\)](#) (9VAC20-81-260.C.2)
4. [Assessment of Corrective Measures \(ACM\)](#) (9VAC20-81-260.C)
5. [Corrective Action Plan \(CAP\)](#) (9VAC20-81-260.D.1.a.(1))

Risk assessments generally follow the methodology described in the National Contingency Plan (NCP) and Risk Assessment Guidance for Superfund (RAGS). Risk assessment is a scientific process and generally speaking, consists of four steps: the evaluation of the hazardous properties of environmental agents (hazard characterization), determining how much of the agent it takes to cause the hazard (dose-response assessment), evaluation of the extent of human exposure to those agents (exposure assessment), and calculating the probability that populations or individuals so exposed will be harmed and to what degree (risk characterization).

In simpler terms, risk assessment is a scientific evaluation of:

1. How much of a chemical is present in an environmental medium (e.g., soil, water, air),
2. How much contact a person or ecological receptor has with the contaminated environmental medium,
3. The inherent toxicity of the chemical,
4. What types of health problems may be caused by chemical contaminants in the environment (two broad types of human health effects are considered in human health risk assessment: carcinogenic (possibility of developing cancer due to exposure to chemical) and non-carcinogenic (possibility of developing non-cancer health effects, for example, kidney, liver, reproduction, hormonal, etc.)), and
5. What, if any, is a level below which some chemicals may not pose significant human health risk.

The risk assessment process usually begins by collecting environmental samples to determine the concentration and extent of chemical contamination in the environment, as well as information needed to predict how the contaminants may behave in the future.

Based on this, the risk assessor evaluates the frequency and magnitude of human exposure that may occur, both now and in the future.

This evaluation of exposure is then combined with information on the inherent toxicity of the chemical to predict the probability, nature, and magnitude of the adverse health effects that may occur.

More information on DEQ's risk assessment approach and calculations, as applicable to solid waste, are explained at the following links: [Step 1 Data Collection and Evaluation](#), [Step 2 Exposure Assessment](#), [Step 3 Toxicity Assessment](#), and [Step 4 Risk Characterization](#).